

THE AEROSPACE INDUSTRY IN TENNESSEE



OVERVIEW

Tennessee brings together major research assets, strong advanced manufacturing capabilities, a skilled workforce, and companies to form a significant aerospace and defense cluster.

Among the major aerospace employers are Vought Industries, Eaton Corp., Standard Aero Alliance, Boeing, Honeywell and Goodrich. The state is also home to several defense-related companies, including gun and ammunition manufacturers such as Barrett Firearms Manufacturing located outside of Murfreesboro, BAE Systems Ordnance in Kingsport and Beretta USA Corporation in Gallatin.

Since 2011, the Tennessee Department of Economic and Community Development has landed eight aerospace- and defense-related projects, totaling more than \$88 million in investment and 695 new jobs.

All together, 47 establishments are engaged in aerospace and defense manufacturing, employing 7,023 people statewide.

Anchoring the state's aerospace cluster is the U.S. Air Force Arnold Engineering Development Center (AEDC), the largest flight simulation facility in the country. On its 4,000-acre complex in Tullahoma, the center operates 43 aerodynamic and propulsion wind tunnels, as well as highly advanced rocket and turbine engine test cells, space environmental chambers, arc heaters, ballistic ranges and other specialized units.

The complex includes 27 test units with capabilities unavailable anywhere else in the U.S., and 14 that are unique in the world. Facilities at AEDC can simulate flight conditions from sea level to 300 miles and from subsonic velocities to Mach 20.

Since its opening in 1951, the center,



located on the Arnold Air Force Base, has tested virtually every high-performance aircraft and missile system the Department of Defense has used, and has been heavily involved in such projects as the space shuttle, space station, and the Mercury, Gemini and Apollo space exploration programs.

In addition, the center attracts both domestic and foreign private industries, allied foreign governments and educational institutions, and its presence has been a draw for private-sector aerospace development in the region.

AEDC employs more than 2,100 Tennesseans, almost all nonmilitary, and economic impact studies put its secondary job creation total at more than 1,500 statewide.

Supporting the aerospace sector is a roster of research assets that include the Oak Ridge National Laboratory (ORNL) and the University of Tennessee Space Institute (UTSI) in Tullahoma.

Tennessee's higher education institutions spent more than \$237 million toward R&D in aerospace-related fields in 2012, about 64 percent of it in engineering. The University of Tennessee – Knoxville invested \$108 million in aerospace-related research in 2012, the most of any institution in the state. Vanderbilt University in

Nashville invested more than \$81 million over this same period, \$55 million of which was invested in engineering research.

The UTSI, a graduate education and research institution and part of the University of Tennessee, has awarded more than 2,000 advanced degrees, including 250 doctoral degrees. The UTSI is internationally recognized for graduate study and research programs in engineering, physics, mathematics and aviation systems.

UTSI also works with the AEDC on research and technology development projects with center personnel. More than 500 AEDC employees have earned graduate degrees at UTSI, including 40 doctorates, and thousands of AEDC workers have participated in continuing education programs.

ORNL, managed by a partnership between the University of Tennessee and Battelle Memorial Institute, is the largest science and energy lab in the federal Department of Energy national laboratory network. With a staff that includes more than 1,600 scientists and engineers, ORNL houses several of the world's top supercomputers. It is a major center of research in areas that include neutron science, nuclear science, clean energy and advanced materials.

TENNESSEE AEROSPACE PRODUCTS & PARTS EXPORT VOLUME (NACIS 3364)

2013
\$1,261,868,146

2012
\$1,231,629,816

2011
\$1,222,639,771

2010
\$1,114,480,294

Source: USA Trade



LAUNCHING PAD

8

Aerospace and defense project commitments since 2011

\$88.3M

Capital investment of aerospace and defense projects in the state since 2011

695

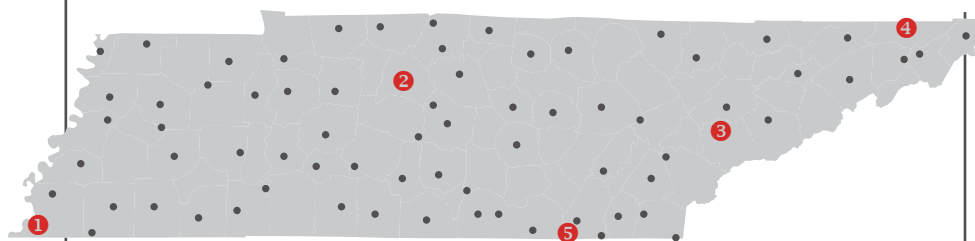
Jobs created from aerospace and defense projects since 2011

\$56.3M

Capital investment by foreign-owned aerospace- and defense-related companies in Tennessee since 2011: Beretta USA (Italy), Southern Precision Machining (UK) and Kilgore Flares Company (UK)

RECENT AEROSPACE AND DEFENSE PROJECT COMMITMENTS

Company	New Jobs	Investment	City	Date
Beretta USA Corp.	300	\$45M	Gallatin	January 2014
Forcex Inc.	175	\$1.9M	Nashville	June 2014
General Products Partners Inc.	100	\$6.5M	Fayetteville	December 2012
UTC Aerospace	44	\$20M	Tulahoma	August 2012
Southern Precision Machining	33	\$3.8M	Shelbyville	July 2013
Delfasco, LLC	25	\$955K	Greenville	June 2012
Military Systems Group Inc.	18	\$2.4M	Nashville	November 2011
Kilgore Flares Company	0	\$7.5M	Toone	March 2012



COMMERCIAL SERVICE AIRPORTS

1 MEMPHIS INTERNATIONAL AIRPORT (MEM) – Memphis

2 NASHVILLE INTERNATIONAL AIRPORT (BNA) – Nashville

3 MCGHEE TYSON AIRPORT (TYS) – Knoxville

4 TRI-CITIES REGIONAL AIRPORT, TN/VA (TRI) – Bristol/Johnson City/Kingsport

5 CHATTANOOGA METROPOLITAN AIRPORT (CHA) – Chattanooga

TENNESSEE AIRPORTS

5

Commercial Service
Airports

74

Public/General Aviation
Airports

142

Heliports

VETERANS STATISTICS

483,549

Veterans in Tennessee

209,877

Veterans aged 18-64 in
Tennessee's labor force

9.6%

Veterans as a percentage of
Tennessee's labor force

Source: U.S. Census Bureau

WAGES & EMPLOYMENT IN TENNESSEE AEROSPACE ENGINEERING OCCUPATIONS

Occupation	SOC Code	2013 Employment	10-Year Projected Employment Growth	Median Hourly Wages
Aerospace Engineers	17-2011	330	31.2%	\$42.32
Electrical Engineers	17-2071	2,538	8.6%	\$41.57
Electronics Engineers, Except Computer	17-2072	1,298	16.2%	\$38.38
Industrial Engineers	17-2112	4,946	9.8%	\$37.28
Mechanical Engineers	17-2141	4,569	11.2%	\$38.36
Aerospace Engineering and Operations Avionic Technicians	17-3021	60	11.7%	\$25.25

Source: EMSI

GROWTH CURVE

\$32.72

Average hourly wage for aerospace products and parts workers in Tennessee

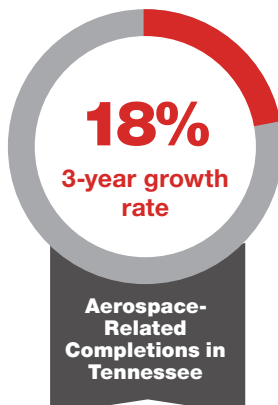
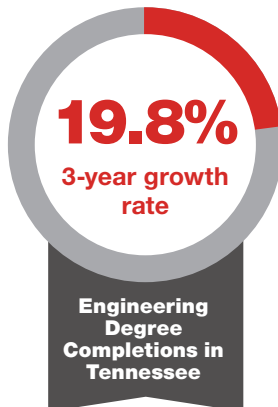
37.5%

Percentage growth in employment in the sector in Tennessee since 2010

2

Rank of Tennessee in aerospace products and parts employment growth between 2010 and 2013

Source: US Bureau of Labor Statistics



Source: EMSI

ARNOLD ENGINEERING DEVELOPMENT CENTER (AEDC)

Location: Tullahoma



Tennessee Employees: 2,176, including military, civilian Department of Defense and contractors



Payroll: \$241.4 million

Operations: 43 aerodynamic and propulsion wind tunnels, rocket and turbine engine test cells, space environmental chambers, arc heaters, ballistic ranges and other specialized units

Capabilities: 27 of the AEDC's test units have capabilities unmatched elsewhere in the U.S.; 14 are unique in the world. Facilities can simulate flight conditions from sea level to 300 miles and from subsonic velocities to Mach 20

Key projects: One of the nation's top priority aerospace programs including the Atlas, Titan, Minuteman and Peacekeeper ICBMs, the space shuttle, space station, and Projects Mercury, Gemini and Apollo

Aircraft system testing: F-35 Lightning II Joint Strike Fighter, F-22A Raptor, A-10 Thunderbolt II, F-14 Tomcat, F-15 Eagle, F-16 Fighting Falcon, F/A-18 Hornet and F/A-18 Super Hornet, F-105 Thunderchief, F-111 Aardvark, F-117A Nighthawk, C-5 Galaxy, C-17 Globemaster III, C-141 Starlifter, B-1B Lancer, B-2 Spirit, B-52 Stratofortress, B-58 Hustler, X-15, X-29, X-32 and X-33, X-35, XB-70 Valkyrie

Missile system testing: Polaris, Poseidon and Trident submarine-launched ballistic missiles; the Minuteman ICBMS, Tomahawk and air-launched cruise missiles, advanced medium-range air-to-air missile

Source: AEDC

OAK RIDGE NATIONAL LABORATORY

Location: Oak Ridge



Staff: ■ 2,600 scientists and engineers ■ 1,880 other (4,480 total)



Major research areas: National Security, Clean Energy, Advanced Materials, Neutron Science, Nuclear Science, Supercomputing and Computation

Guest researchers: 3,000 each year, about one-fourth from industry

Budget: \$1.46 billion, 83% Department of Energy, 17% work for others

Replacement cost of buildings: \$7 billion

Total land area: 58 square miles

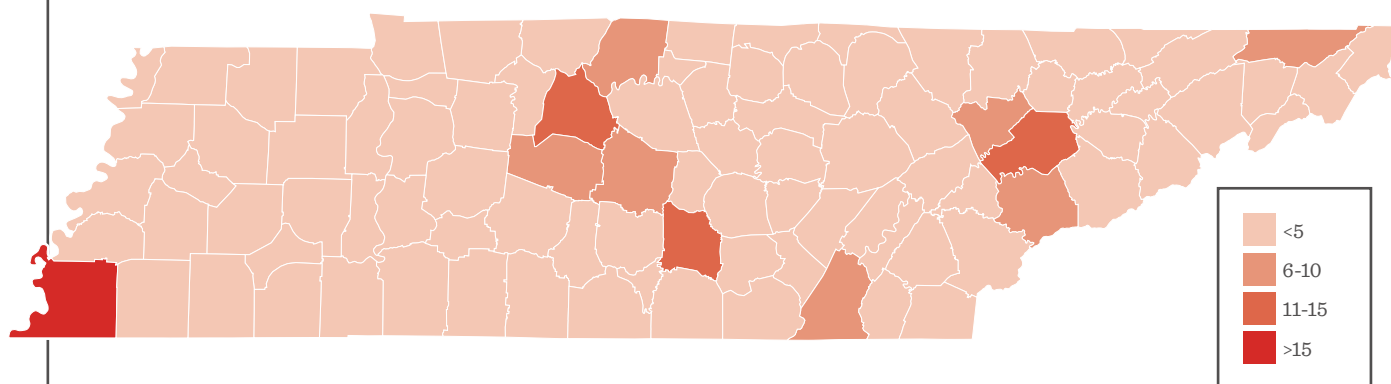
Wages: \$428 million

Procurement: \$640 million

Source: ORNL

1 person icon = 200 employees

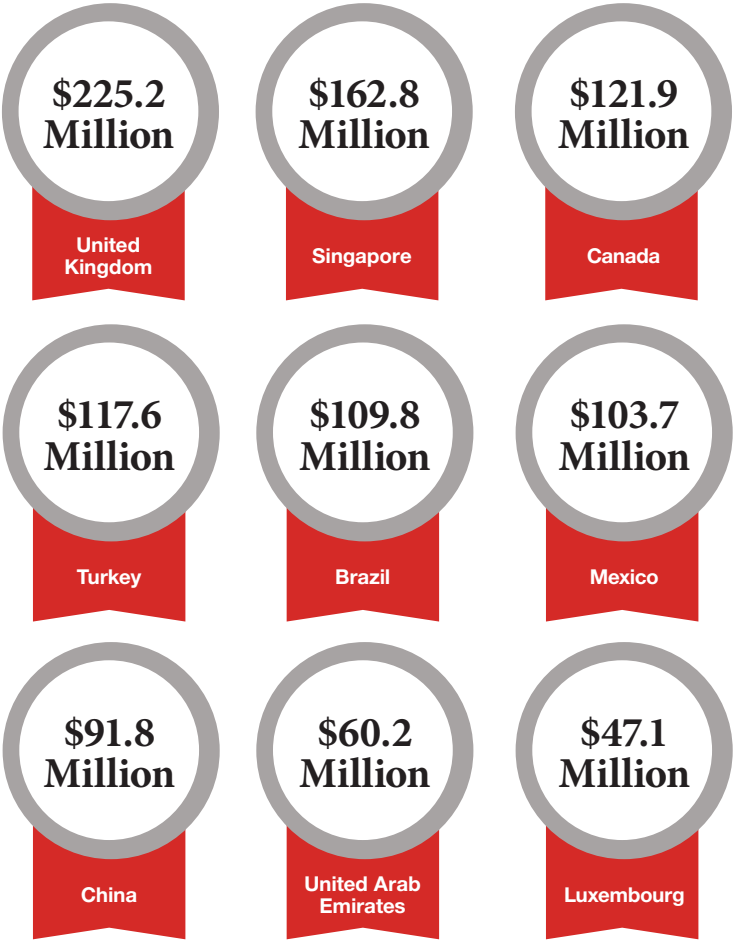
AEROSPACE AND DEFENSE COMPANIES



MAJOR TENNESSEE EMPLOYERS IN AEROSPACE AND DEFENSE INDUSTRIES

Company Name	Statewide Employment	Tennessee Location(s)
Babcock & Wilcox Technical Services Y-12, LLC	4,800	Oak Ridge, Erwin, Ooltewah, Knoxville
Aerospace Testing Alliance	1,600	Arnold AFB
Triumph Aerostructures-Vought	1,100	Nashville
GE Capital Aviation Services	725	Multiple locations statewide
Eaton Corporation	650	Cleveland, Memphis, Gainesboro, Newbern
Aeronautical Accessories, Inc.	600	Piney Flats
Honeywell International Inc.	500	Memphis
Kilgore Flares Company	500	Toone
BAE Systems Ordnance Systems Inc.	450	Kingsport
Bell Helicopter Textron Inc.	350	Piney Flats
Standard Aero Alliance Inc.	299	Maryville
UTC Aerospace Systems	222	Tullahoma
Delfasco, LLC	150	Afton
Wire Masters Inc.	120	Columbia
Barrett Firearms Manufacturing, Inc.	110	Murfreesboro

**MAJOR DESTINATIONS FOR TENNESSEE
AEROSPACE EXPORTS (2013)**



Source: USA Trade

SECTOR FACTS

47

Establishments in Tennessee engaged in aerospace and defense manufacturing

7,023

Tennesseans employed in aerospace and defense manufacturing

32

Aerospace products and parts establishments in Tennessee

2,160

Tennesseans employed in aerospace product and parts manufacturing

Source: EMSI

